Air Board research department on having overcome all the difficulties.

The promise for the future of aviation is very bright, and the recognition of the necessity for continuous research in the development of both military and civilian aeronautics leaves little doubt that the resources of scientific investigation, which have been of incalculable value during the war, will be fully employed in the solution of the problems of the future.

LUDVIG SYLOW.

THE death of Ludvig Sylow (September 7, 1918), at the age of eighty-five, has removed an eminent mathematician, whose career was in many ways remarkable. Sylow's seventh published paper ("Théorèmes sur les groupes de substitutions") occupies less than ten pages in vol. v. of the *Mathematische Annalen* (1872); this contains the proof of his justly celebrated theorem about groups, which has perhaps done more than any other single proposition to advance our knowledge of groups in general. In spite of this great achievement, Sylow had to earn his living as a secondary-school teacher until he had served a term of forty years. Recognition came at last; he was made professor at Christiania at the age of sixty-five, and filled the chair successfully for twenty years.

It may be of interest to recall Sylow's own statement of his theorem: "Si n^α désigne la plus grande puissance du nombre premier n qui divise l'ordre du groupe G, ce groupe contient un autre g de l'ordre n^α; si de plus $n^\alpha\nu$ désigne l'ordre du plus grand groupe contenu dans G dont les substitutions sont permutables à g, l'ordre de G sera de la forme $n^\alpha\nu(np+1)$." It should be noted that Sylow gives a proof that, if n^α is the highest power of n contained in the order of G, then G contains a subgroup of order n^α.

Sylow wrote a number of other papers, dealing with such topics as group-theory, solution of equations by radicals, elliptic functions, modular functions, etc.. In collaboration with Lie he undertook the arduous task of editing the second issue of Abel's works. In this the misprints and oversights of the original edition are corrected, and a number of valuable notes and comments by the editors are added.

G. B. M.

NOTES.

THE appointment of Dr. S. F. Harmer to succeed Sir Lazarus Fletcher as director of the Natural History Museum, South Kensington, is a happy solution of the question raised by the letter from twenty-three naturalists published in NATURE of March 6, and commented upon by us in the same issue. Dr. Harmer has been keeper of the Department of Zoology of the museum since 1907, and he will retain this position until the end of next year. During this transition period Mr. C. E. Fagan, the assistant secretary, will assist him in the control of the museum, and, in recognition of his valuable services, will occupy a considerably improved position on the staff. Mr. C. Tate Regan has been appointed assistant keeper of zoology in succession to Mr. W. R. Ogilvie Grant, who has retired. As the Trustees have appointed a distinguished naturalist to the directorship of the museum, the series of eminent scientific men who have occupied that post remains unbroken. It is the duty of men of science to guard jealously their claims to direct the affairs of scientific institutions, and to protest when any encroachment upon them is contemplated. In the present instance Mr. Fagan was more than a purely lay administrator, and his scientific services have been appropriately recognised by the Trustees. The tendency is, however, to place lay administrative officers in control of State institutions concerned with scientific work, on the ground that a man of science cannot be a good administrator. Even if this general belief, cherished in the Civil Service, could be justified—and we do not accept it for a moment—the highest office in a scientific institution should be held by a scientific man, and not by a lay official. That is the whole point of our contention, and we are glad that the Trustees have accepted what is the feeling of scientific men generally in regard to it by appointing Dr. Harmer to the vacant post, which he is highly qualified to fill.

LORD SUDELEY is to be thanked for having brought the House of Lords to such a high appreciation of museums as educational instruments that, on March 12, in the face of some Government objections, it wholeheartedly agreed to his motion:—"That his Majesty's Government should, without further delay, reinstate the system of providing official guide-lecturers for the museums and picture galleries under the control of the Government, which, with one exception, has been in abeyance during the war, making such addition to the numbers and in the salaries and status of the guides as may be found necessary." The Government, it seems, is prepared to reinstate the pre-war conditions, but is not prepared to increase the numbers or salaries of the guide-lecturers; neither does it act with promptness in clearing the museums of alien departments. There can be no doubt as to the popular feeling in this matter, and when, twice within a fortnight, it is supported in the Upper Chamber by men of such weight as Lords Crewe, Harcourt, Meath, Morris, Gainford, and Rathcreedan, then a Government which contains many sympathetic elements should surely be emboldened to spend the relatively minute sum needed to set all this valuable educational machinery in motion. His Grace the Archbishop of Canterbury urged that an increased number of guides would permit the extension of co-operation between the British Museum and the primary schools through lectures to the teachers, who would then take their classes to the museum; there could also then be an extension of similar aid to schools of art and secondary schools. Incidentally, the Primate took occasion to extol the merits of the British Museum guide-books, from which, he rightly said, visitors might derive much advantage. Can he be aware that the General Guide to the Natural History Museum has been out of print for some years, and that a sale of many thousands to the visiting troops and others has thus been lost? A new edition of this guide should be an early claim on the time of the new director.

THE question of long-distance wireless telegraph communication is now engaging the attention of a Committee recently appointed by the War Cabinet, with Lord Milner as chairman. The need for action has long been felt, and the recent traffic delays in cable messages have accentuated the position. It is scarcely likely that the construction of stations will proceed on the lines decided upon some time before the outbreak of the war. For one thing, the developments which are said to have been made in long-distance wireless communications during the past four and a half years will bring about a modification of the engineering features of the original scheme, while the changed political situation will doubtless lead to some alteration in the location of stations. It is also a decided gain that some attempt at co-ordination is now being made in this country. Hitherto, while no fewer than five home Departments have been directly concerned in the matter, the Post Office has been the only Department to act for the State. The result has been long-drawn-out correspondence with other offices, very commonly culminating in nothing being done. Under the new plan each of the Government Departments concerned will be represented on the recently appointed Telegraph Communication Board. Thus the individual delegates, meeting round a table, will be able to thresh things out comparatively quickly and in a far more satisfactory manner than hitherto.

One result of the war is that the military objections to the construction of a tunnel between this country and France have been overcome, and the work may be sanctioned within a short time. In 1875 the Channel Tunnel Co. obtained powers for preliminary works at St. Margaret's Bay, Dover, and at the same time the French Submarine Railway Co. made surveys and started a heading at Sangatte. But in 1883 a Joint Select Committee of the two Houses of Parliament decided that it was inexpedient that sanction should be given for the construction of a tunnel. Investigations have, however, continued, the promoters believing that opposition would in time be overcome. The chalk cliffs on the two sides of the Channel are similar in all respects, and rest on a stratum of grey chalk 200 ft. thick, which is impervious to water. This overlies Gault, also impervious. The tunnel is to be constructed in the grey chalk, except that at one end it may possibly enter the Gault. The excavation is easy, and no exceptional engineering difficulties are anticipated. Two parallel tunnels, 20 ft. in diameter, will be constructed for up and down traffic. One or both ends will be carried some distance inland. The total length will be thirty-three miles, about twenty-four being under the sea. It is estimated that the tunnel can be completed in six or seven years at a total cost of 20,000,000*l*. Electric traction will be adopted, which diminishes the difficulty of ventilation, and the transit will occupy about forty minutes. A small difference in the track gauge here and in France presents no difficulty. But the French loading gauge is wider than ours, so that some trains could not pass over our lines unless an alteration is made on our side. The variety of loading gauges on different lines in this country is very objectionable.

Our contemporary the *Chemist and Druggist* for March 8 is dissatisfied with the attempt made in our article on "The Profession of Chemistry" (February 27) to differentiate chemist and pharmacist. Exception is taken to "the desire to monopolise for professional chemists the title which, first of all, indicates the seller of poisons and dispenser of medicines. It is as unreasonable to claim the monopoly of the word 'chemist' for a small class of persons as it would be to restrict the title 'engineer' to those who build a bridge or the word 'doctor' to those men who hold a medical degree." Unreasonable or not, it has to be done, sooner or later, in the interest of the public, not of "a small class of persons." English is a strange language; the meanings of words are often curiously varied in course of time and whilst rich in many ways, in others it is remarkably deficient. Etymologically, "apothecary" is the keeper of a shop, a "pharmacist" or "pharmaceutist" one who has to do with medicines; the meaning of "druggist" is clear to everyone; "chemist" has no original meaning. Having the choice of three terms with definite, well-understood connotations, the sellers of drugs and poisons may surely be satisfied; they may well agree to relinquish the vague fourth term to those who are chemists in fact. "Doctor" is the equivalent of "Dozent" and well known to be a courtesy title like "esquire," no more descriptive as applied to medical practitioners, though a volume might be written on its history and the strange and careless way in which a specialised meaning has been attached to it, whilst "esquire" has lost its original value. The medical man, it may be said, who is neither a physician nor a surgeon is even worse off than the chemist, having no name which is distinctive of his status.

The lively discussion which was waged over the Foxhall human mandible in the sixties of last century is likely to be again revived by the advertisement inserted by Mr. Reid Moir in the personal column of the *Times* and in last week's Nature. Mr. Moir, as is well known, has discovered and described many worked flints in the detritus bed which underlies the Red Crag of Suffolk, but no particle of man's body has yet been found at the same geological horizon with the exception of the Foxhall jaw, which, it is alleged, was derived from the detritus or coprolite bed. The mandible was in the possession of Dr. R. H. Collyer, who described it in the *Anthropological Review* of 1867; Dr. Collyer is said later to have gone to the United States, and with him the disputed specimen disappeared. It will be interesting to see if Mr. Moir's advertisement will succeed in recovering the missing mandible. Dr. Collyer's figure shows very plainly that the mandible belonged to a man of the modern type, and is remarkably similar in form to the equally hotly contested Moulin Quignon specimen found by Boucher de Perthes in the earlier Palæolithic strata near Abbeville in 1863. When Dr. Hugh Falconer and Mr. George Busk subjected the Moulin Quignon jaw to certain tests, they also applied them at the same time to the Foxhall specimen, and came to the conclusion, because of the amount of organic matter contained in them, that neither specimen could be regarded as contemporary with the strata in which it was alleged to have been found. The criteria which they applied, however, cannot be regarded as definitely deciding the authenticity of these two human "documents."

The opposition raised both inside and outside the House of Commons, by members of the medical profession particularly, against the proposal in the Ministry of Health Bill to reconstitute the Medical Research Committee under the direction of a Committee of the Privy Council rather than under the Health Ministry was apparently not without its effect. Dr. Addison has, indeed, now issued a memorandum on the subject, setting out the advantages likely to follow the adoption of the proposed scheme, and the disadvantages which would result from its rejection. The claims made on behalf of the scheme of reconstruction are briefly that, in the realm of medical research, there will be obtained complete concentration in a central body acting for the United Kingdom as a whole, and not only for England and Wales, the area in which the new Ministry will operate; also that, in respect of all medical research questions, a wider exchange of knowledge will be secured, for the reason that the Privy Council is the only body having an Imperial range. Finally, under such a scheme, the Committee would be freed from undue pressure by the immediate interests of any one Department, particularly the Ministry of Health. So far as the latter is concerned, the memorandum hastens to point out that there must be very special links as between it and the Committee, and arrangements to secure these would have to be made. Another point to which prominence is given is that, even with a Research Committee and special researchers, there need be no limiting of the efforts of the Ministry in the matter of scientific investigations, and at any time researches could and would be made through the staff of the Ministry. The memorandum, which is signed by Dr. Addison, is supported by a statement by Sir W. M. Fletcher, the secretary to the Research Committee, in favour of centralisation, for the reason chiefly that researches carried out on behalf of one Department so frequently yield accessory results of value to others. There was a considerable amount of discussion upon the subject when the Bill came before the Standing Committee on March 13, and Major Astor was obliged to accept an amendment making it clear that, in addition to an independent Medical Research Committee under the Privy Council, there would be a definite research department under the new Ministry. Probably this is the best way out of the difficulty, and both parties may be content to accept the compromise. The Standing Committee of the House of Commons adopted on March 18 an amendment providing that all the powers and duties of the Board of Education with respect to the medical inspection and treatment of children and young persons should be transferred to the Ministry of Health.

THE death is announced, at seventy-five years of age, of Col. F. P. Washington, R.E., for many years connected with the Ordnance Survey, and from 1898 to 1908 a director of the Survey and Map Department of the Land Registry.

A WIRELESS PRESS message states that the German Government has decided to return to China the astronomical instruments which were transported from Pekin to Germany in 1900. Negotiations have been opened for the shipping of the instruments to China.

THE annual general meeting of the Chemical Society will be held at Burlington House on Thursday, March 27, at 4 o'clock, when the retiring president, Sir William J. Pope, will deliver his address, and a ballot for the election of the new council will take place. The anniversary dinner of the society will be held the same evening at the Connaught Rooms, Great Queen Street, W.C.2.

DR. L. A. BAUER left Washington early in March for England, where he will organise an expedition, of which Mr. Frederick Brown, of London, will be a member, for magnetic and electric observations during the solar eclipse of May 29 next at a station in South Africa. Dr. Bauer expects next to proceed to South America and arrange for similar observations during the eclipse there. While in South America he will visit various institutions, and return to Washington next July.

THE death is announced, in his seventy-third year, of Mr. Louis E. Levy, of Philadelphia, who took out in 1875 the first patent granted to an American citizen in the field of photo-chemical engraving. Mr. Levy received medals from the Franklin Institute for his invention of the "Levy line screen," the "Levy acid blast," and the etch-powdering machine. His discoveries were also recognised by the expositions at Chicago in 1893, Paris in 1900, and St. Louis in 1904. Mr. Levy had been president of the Graphic Arts Co., of Philadelphia, since 1908.

THE deaths of the following engineers are recorded in the *Engineer* for March 14:—Alderman Thomas Canning, associate member of the Institution of Civil Engineers, who was appointed engineer and manager of the Newport Gas Co. in 1874, and held office up to the time of his death; Mr. R. W. A. Southern, member of the Institution of Mining Engineers, a mining engineer well known in South Wales as a colliery manager, and in private practice; and Mr. G. H. Hill, member of the Institution of Civil Engineers, and largely responsible for the water supply of Manchester, especially in connection with the Thirlmere scheme.

THE Salters' Institute of Industrial Chemistry has awarded fellowships for post-graduate study in the universities or colleges indicated to Messrs. W. H. Gough and W. A. Haward (Imperial College of Science and Technology), Capt. L. J. Hudleston (Reading), Lieut. K. H. Saunders and Mr. Gordon M. Wright (Cambridge), Mr. P. N. Williams (Liverpool), and Mr. Dudley C. Vining (Finsbury Technical College). Through the generosity of certain leading firms, the institute hopes shortly to announce further appointments; those who have already provided funds for assisting the purpose of the institute are Messrs. Borax Consolidated, the Mond Nickel Co., and Lever Brothers.

THE council of the Royal Institute of Public Health is arranging for a conference in the Guildhall, London, on "Problems of Reconstruction in Relation to Public Health" on June 25–28. The opening meeting will be held in the Egyptian Hall of the Mansion House on Wednesday, June 25, when the Lord Mayor of London will preside. The conference will be devoted to the work of the Ministry of Health, the prevention and arrest of venereal disease, housing in relation to national health, maternity and child welfare, and the tuberculosis problem under after-war conditions. Full particulars may be obtained on application to the Secretary, Royal Institute of Public Health, 37 Russell Square, W.C.1.

THE *Times* of March 17 gives an account from its correspondent at Sydney of a remarkable Australian rainfall. It states that "the extraordinary rainfall at Melbourne threatens the greatest flood since 1891. The south-eastern corner of Victoria and New South Wales is almost engulfed. At Port Melbourne factories have been swamped." At the time of the report, March 7 (delayed), rain was still falling. "At Macedon 8 in. were registered in twenty-four hours, and other watersheds have been converted into lakes. Thousands of persons are homeless. Thirteen inches of rain in twenty-four hours has practically drowned the township of East Bellingen, in New South Wales. Although the damages are estimated to aggregate tens of thousands of pounds, the benefits from the breaking of the drought will be represented by hundreds of thousands."

WE regret to have to record the death on February 16, from pneumonia following influenza, of Mr. R. W. H. Row, lecturer in zoology at King's College, London. Although only thirty-four years of age, Mr. Row had already done much to advance the science to which he had devoted himself, both as a teacher and as an investigator. He had, partly in co-operation with Prof. Dendy, published several memoirs on sponges, on which he had become a recognised authority. Since 1914 Mr. Row had been responsible for the section of the Zoological Record and International Catalogue of Scientific Literature dealing with this group of animals. After the outbreak of the war he devoted himself largely to protozoology from the pathological point of view, working under Sir Ronald Ross, and at the time of his death, in addition to his ordinary duties, he was in charge of the malaria laboratory at the 4th London General Hospital. Besides the routine work of blood examination, etc., Mr. Row managed to do a good deal of original work in this branch of zoology. He left much unfinished work behind him, and the loss to zoological science occasioned by his death is great.

The Royal Geographical Society announces that the King has been pleased to approve the award of the Royal medals as follows:—The Founder's medal to Col. E. M. Jack for his geographical work on the Western Front, and the Patron's Medal to Prof. W. M. Davis, of Harvard University, for his eminence in the development of physical geography. The Victoria medal is awarded by the council to Prof. J. W. Gregory for his many and important contributions to geographical science; the Murchison grant to Dr. W. M. Strong, of the North-Eastern District, Papua, for his journeys and surveys in New Guinea; the Cuthbert Peek grant to Prof. Rudmose Brown for his geographical work in the Antarctic and in Spitsbergen; the Back grant to the Ven. Archdeacon Stuck, of Fort Yukon, for his travels in Alaska and ascent of Mount McKinley; and the Gill memorial to Mr. W. J. Harding King for his investigations of desert conditions in northern Africa.

The *Times* of March 13, under the heading of "Influenza Worse than Many Plagues," gives a startling statement from its Delhi correspondent based on a Government report of the influenza epidemic by Major Norman White, who has just vacated the position of Sanitary Commissioner, which he had filled with distinction. "Major White declares that from the incomplete information available it would appear that no country has suffered as severely from the disease as India during the last quarter of 1918. Without fear of exaggeration, it can be stated that influenza was responsible for six million deaths, equivalent to more than half the mortality attributable to plague in the twenty-two years during which plague has been epidemic in this country. Five million deaths occurred in British India, and one million in the native States." Major White states that the incidence of the epidemic "was very high among the well-fed British troops, higher, indeed, than among the Indian troops." In his report he says: "It can be stated without exaggeration that from 50 to 80 per cent. of the total population have recently suffered from influenza."

The Registrar-General's return for the week ending March 8 gives the following highly satisfactory statement:—"The influenza epidemic appears now to have passed its most severe stage, the number of deaths registered in the ninety-six great towns having declined from a maximum of 3889 in the week ended March 1 to 3218 last week, and in London from 808 to 597." The general health of London has also improved, the annual death-rate per thousand of the aggregate population having further decreased from 32·4 in the preceding week to 26·6 in the week ending March 8. The deaths from influenza are, however, still very high, being more than double those in any week during the summer epidemic of 1918, and more than one-half of the total deaths in the eight weeks of that epidemic, also larger than in any week of any previous epidemic since 1890, 560 deaths in a single week during the attack in 1892 being until the present epidemic the highest on record. The epidemic which started in London during the week ending October 12, 1918, has now continued for twenty-two weeks, causing 14,344 deaths out of 45,262 total deaths from all causes; the deaths, however, fell below 100 during each of the six weeks from the end of December last year to the commencement of February this year.

On March 5 the Natural History Museum Staff Association held in the board room of the museum, by permission of the Trustees, its inaugural scientific reunion. The object of these meetings, which it is intended at first to hold about four times a year, is twofold: in the first place, members of the staff will be afforded an opportunity of meeting one another and of seeing something of the work done in departments other than their own, and, in the second, scientific workers outside the museum, who are invited to attend, will have an opportunity of seeing some of the more interesting of the specimens which have been recently added to the collections, and also of becoming acquainted with some of the research work carried on at the museum. The number of visitors is necessarily limited, because the capacity of the board room—the only room available—is not great. Major E. E. Austen, of the Entomological Department, gave an interesting lecture on the anti-mosquito work carried out in Palestine during the campaigns of 1917 and 1918. The exhibits included the following:—A series of skulls of whales found round the British Isles, a case illustrating the depredations of marine boring animals, the Church collection of precious stones, a slice of the Skookum meteorite, specimens illustrating curvature in crystals, Carragheen moss and invalid dishes made with it, specimens showing mechanical adaptation in labroid fishes, some of the suite of butterflies in the Dollman collection, German substitute tobacco, etc.

The British Association Fuel Economy Committee, which was originally appointed in 1915, and issued its first report in 1916, has, owing to the urgency and importance of the coal situation and fuel economy in connection with reconstruction problems, been reappointed to continue its investigations upon the various economic, scientific, and technical issues connected with the production and utilisation of coal and other fuels. Prof. W. A. Bone has been reappointed chairman, with Mr. H. James Yates as vice-chairman, and Mr. Robert L. Mond as secretary. The general committee of thirty-three members includes representatives of the Association of British Chemical Manufacturers, Coke-Oven Managers' Association, Federation of British Industries, Institution of Electrical Engineers, Institution of Gas Engineers, Institution of Mechanical Engineers, Institution of Mining and Metallurgy, Institution of Mining Engineers, Iron and Steel Institute, Society of British Gas Industries, and Society of Chemical Industry. The executive committee, which consists of Sir Robert Hadfield, Sir Joseph Walton, M.P., Profs. W. A. Bone, Henry Louis, and W. W. Watts, Dr. H. S. Hele-Shaw, Messrs. A. Hutchinson, Robert Mond, W. H. Patchell, H. Woodall, C. H. Wordingham, and H. James Yates, meets in London on the second Wednesday in each month. The Committee is now compiling data and information concerning a number of subjects of public interest, including, *inter alia*, such questions as (1) the economic aspects of coal production in Great Britain, (2) low-temperature distillation of coal, (3) future standards for public gas supplies, and (4) the proposed electric power scheme, etc., and invites individuals, firms, or institutions who may possess information of value to place it at the disposal of the Committee. All communications should be addressed to Prof. W. A. Bone at the Imperial College of Science and Technology, South Kensington.

WE regret to record the death on February 28, in his fifty-eighth year, of Mr. F. C. Forth, principal of the Municipal Technical Institute, Belfast. Mr. Forth's death has removed from that city, and from Ireland generally, a potent force in the promotion of scientific and technical instruction and training. On the passing of the Agriculture and Technical Instruction (Ireland) Act of 1899 the Corporation of Belfast took immediate steps to inquire into the facilities for technical instruction existing in Belfast and found them totally inadequate, only five institutions existing with some seven or eight hundred students enrolled. It thereupon decided to appoint a principal and director of technical instruction and to prepare a scheme for a new building, and in 1901 Mr. Forth, then vice-principal of the School of Technology, Manchester, took up the post. An admirable site was secured, and with the aid of the new principal, whose knowledge and experience gained in Manchester proved of singular service, a splendid building, standing on upwards of 5000 square yards in one of the principal avenues of Belfast, was erected, calculated to serve the best interests of the great engineering, textile, and other industries of the city. The foundation-stone was laid in November, 1902, and the building opened by the Lord-Lieutenant in 1907; and the institute has now an enrolment of 7000 individual students. Mr. Forth was a born teacher and organiser, able to infuse his enthusiasm into both students and colleagues. In 1915 he was elected a fellow of the Royal College of Science, Ireland, "in consideration of the manner in which, through your work as an educationist in the field of technical instruction, you have contributed to the advancement of science in Ireland." At a special meeting of the Library and Technical Instruction Committee of the Belfast Corporation a resolution was passed recording its sense of the profound loss sustained by the corporation and the city generally in the death of the highly esteemed and brilliantly successful principal of the Municipal Technical Institute, Mr. F. C. Forth.

A MEETING of the Illuminating Engineering Society on February 25, when the lighting of railways was discussed, was attended by representatives of a number of the leading railways. Mr. A. Cunnington, lighting engineer to the London and South-Western Railway, who read the introductory paper, remarked that by the aid of available experience tentative standards for the lighting of platforms, goods sheds, and goods yards could now be formulated. Stations were divided into three classes, the specified illumination being 0·5, 0·25, and 0·035 foot-candle respectively, measured in a horizontal plane 3 ft. above the platform. In goods sheds, values about twice as high were suggested. A number of special installations were described, including corridors, parcels offices, and signal-boxes. In the discussion, the importance to railway companies of employing an expert in lighting to deal with all problems connected with illumination was strongly emphasised.

OUR ASTRONOMICAL COLUMN.

PHOTO-ELECTRIC DETERMINATIONS OF STELLAR MAGNITUDES OF PLANETS.—*Astr. Nach.*, No. 4976, contains a paper by P. Guthnick on the application of this very accurate method to the determination of the stellar magnitudes of Saturn and Mars. The individual results show that the probable error of a determination is in the neighbourhood of 0·01m. The results of a comparison of Saturn with Pollux are given for four oppositions; after allowing for the changing aspect of the ring they are practically constant, and show that without the ring the planet is just 1/3 mag. brighter than the star. As two of the oppositions were at sun-spot minimum and two at maximum, the inference is also drawn that there is no sensible variation of sunlight in the course of the cycle. Very numerous comparisons of Mars with standard stars were made; the results are grouped according to longitude of central meridian, and show that the planet is variable to the extent of 1/6 mag., according to the portion presented to us. The light-curve obtained is consistent for the same opposition, but varies from one opposition to another with the different pose of the planet's equator and the amount of snow or cloud that is present on the disc.

NOVA AQUILÆ.—The Monthly Notices of the Royal Astronomical Society for December last contains papers on this nova's spectrum by the Rev. A. L. Cortie and Dr. J. Lunt. The former reproduces six spectra photographed in June and July, which illustrate the development of the hydrogen bands. Both papers give wave-length tables and identifications; lines due to iron, titanium, chromium, scandium, barium, helium, calcium, etc., are identified. Both also note that the line-of-sight velocities fall into two groups, one of the order of −1500 km./sec., the other of the order of −800 km./sec.

The same issue of the Monthly Notices contains a paper by Dr. A. A. Rambaut on the visual magnitudes of the nova from June 9 to December 10; the table shows a well-marked periodic variation with a period of eleven days during July and August; after correcting for the progressive decline, the range from maximum to minimum was just half a magnitude.

THE VARIABLES OF LONG PERIOD.—Many astronomers have of late inclined to the theory that the red variable stars, of types M and N, are dwarf stars, near the end of their career as suns, on which an incipient crust is forming. Mr. W. Gyllenberg, of the Lund Observatory (*Arkiv för Matematik, Astronomi och Fysik,* K. Svenska Vetenskapsakademien, Band 14, No. 5), examines the question of their distances by means of their proper motions. Contrary to the above dwarf theory, he finds that the stars are very distant, and must be classed as giants, their mean absolute magnitude at maximum (at a distance of 10 parsecs) being −0·65, making them comparable in absolute lustre with stars of the types B8 to A2. The mean velocity in all directions comes out as 37·7 km./sec., in admirable accord with the value 36·4 found by Mr. Paul W. Merrill (*Astrophysical Journ.*, xli., 247) from motions in the line of sight.

Adopting the above mean absolute magnitude, and plotting the distances of the stars from their brightness, they show greater extension in the galactic plane than perpendicular to it, which confirms the conclusion that they are distant. The denser parts of the system extend to 3000 L.Y. in the plane, 1000 L.Y. perpendicular to it. The distances found for the M variables accord well with those previously found for non-variable giant stars of type M. It thus appears that long-period variability is an incident in the early history of star-life.